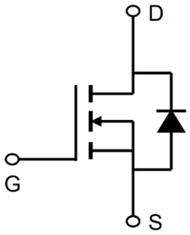
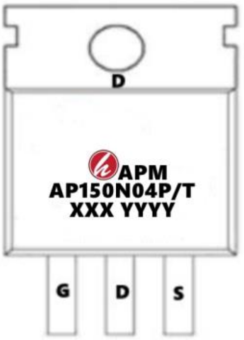
AP150N04P/T

40V N-Channel Enhancement Mode MOSFET

Description

The AP150N04P/T uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.





General Features

V_{DS} = 40V I_D =150A

$R_{DS(ON)}$ < 2.9mΩ @ V_{GS}=10V **(Type：2.4mΩ)**

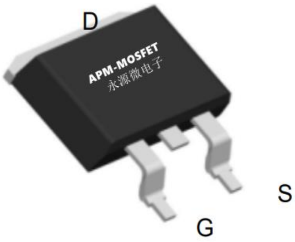
Application

Battery protection

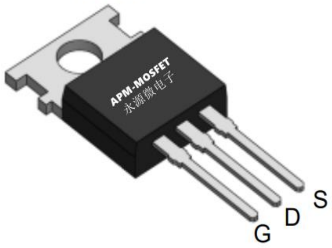
Load switch

Uninterruptible power supply

TO-263
D²PAK



TO-220



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP150N04P	TO-220-3L	AP150N04P XXX YYYY	1000
AP150N04T	TO-263-3L	AP150N04T XXX YYYY	800

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25˚C	Continuous Drain Current, V_{GS} @ 10V[1]	150	A
I_D@T_C=100˚C	Continuous Drain Current, V_{GS} @ 10V[1]	102	A
I_{DM}	Pulsed Drain Current[2]	576	A
EAS	Single Pulse Avalanche Energy[3]	576	mJ
I_{AS}	Avalanche Current	40	A
P_D@T_C=25˚C	Total Power Dissipation[4]	57	W
T_{STG}	Storage Temperature Range	-55 to 150	˚C
T_J	Operating Junction Temperature Range	-55 to 150	˚C
$R_{θJA}$	Thermal Resistance Junction-ambient (Steady State)[1]	62	˚C/W
$R_{θJC}$	Thermal Resistance Junction-Case[1]	1.3	˚C/W

Electrical Characteristics (T_J=25℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=250μA	40	44		V
IDSS	Zero Gate Voltage Drain Current	V_{DS}=40V, V_{GS}=0V			1	μA
IGSS	Gate-Body Leakage Current	V_{GS}=±20V, V_{DS}=0V			±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS, ID=250μA	1.0	1.8	2.5	V
gFS	Forward Transconductance	V_{DS}=5V, I_D=20A		38		S
RDS(ON)	Drain-Source On-State Resistance	V_{GS}=10V, I_D=20A		2.4	2.9	mΩ
		V_{GS}=4.5V, I_D=20A		3.5	4.5	mΩ
Ciss	Input Capacitance	V_{DS}=20V,V_{GS}=0V, f=1.0MHz		6460		pF
Coss	Output Capacitance			455		pF
Crss	Reverse Transfer Capacitance			276		pF
Rg	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1.0MHz		0.67		Ω
td(on)	Turn-on Delay Time	V_{GS}=10V, V_{DS}=20V, RL=1Ω, RGEN=3Ω		18		nS
tr	Turn-on Rise Time			4.4		nS
td(off)	Turn-Off Delay Time			67		nS
t_f	Turn-Off Fall Time			9.5		nS
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=20V, I_D=20A		112		nC
Qgs	Gate-Source Charge			16.7		nC
Qgd	Gate-Drain Charge			26.5		nC
ISD	Source-Drain Current (Body Diode)				144	A
VSD	Forward on Voltage (Note 3)	V_{GS}=0V, I_S=20A			1.2	V
trr	Reverse Recovery Time	I_F=20A, dI/dt=500A/ s		6		ns
Qrr	Reverse Recovery Charge	I_F=20A, dI/dt=500A/ s		14		nC

Note :

1、The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.

2、The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3、The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=20A

4、The power dissipation is limited by 150℃ junction temperature

5 、The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

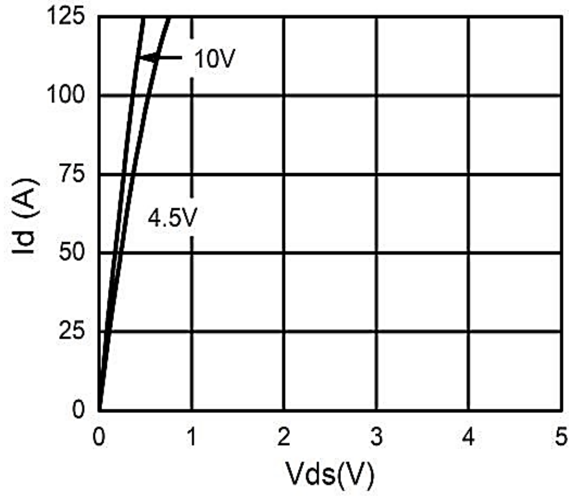


Figure 1. Output Characteristics

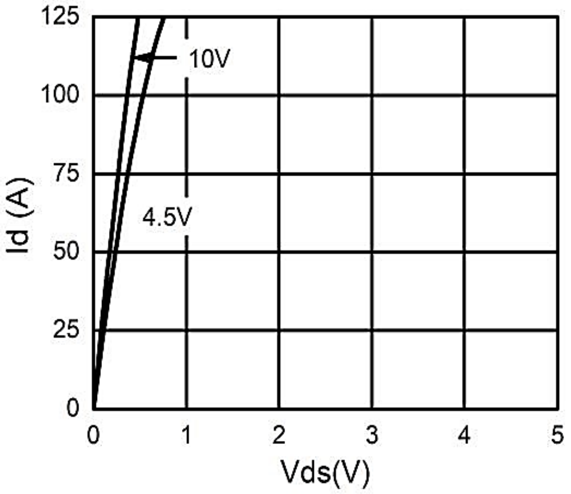


Figure 2. Transfer Characteristics

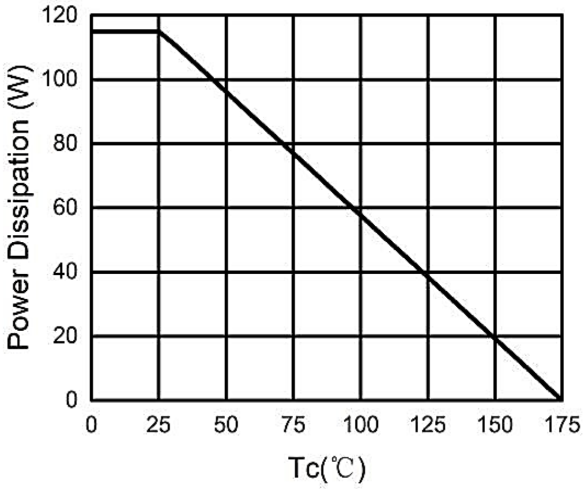


Figure 3. Power Dissipation

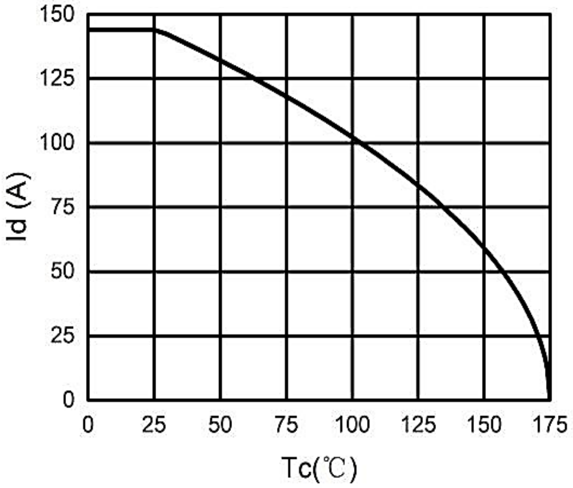


Figure 4. Drain Current

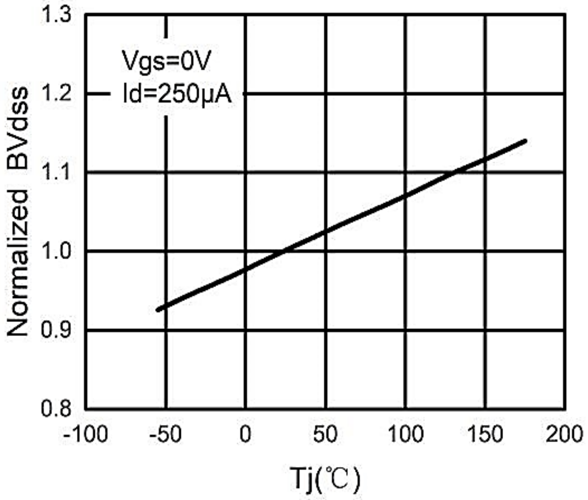


Figure 5. BV_{DSS} vs Junction Temperature

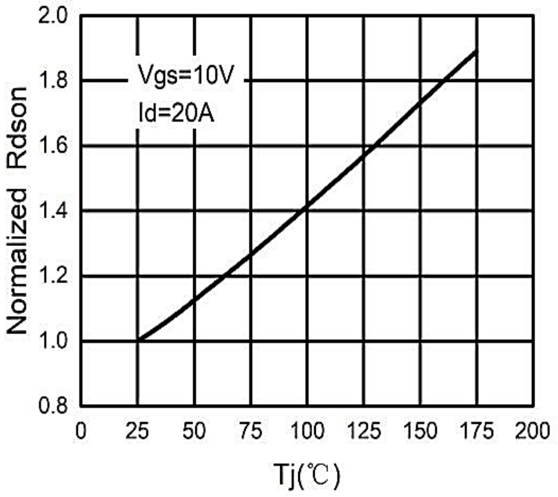


Figure 6. $R_{DS(ON)}$ vs Junction Temperature

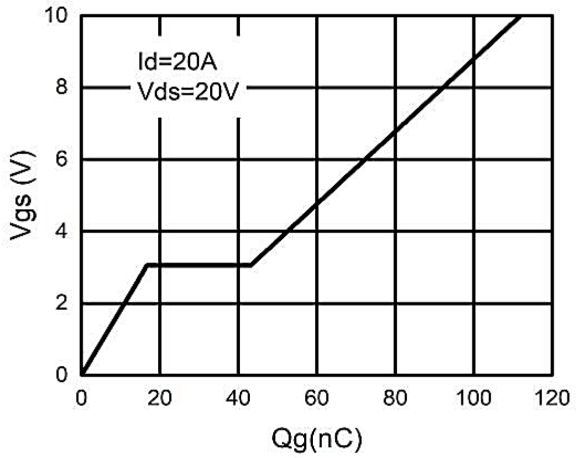


Figure 7. Gate Charge Waveforms

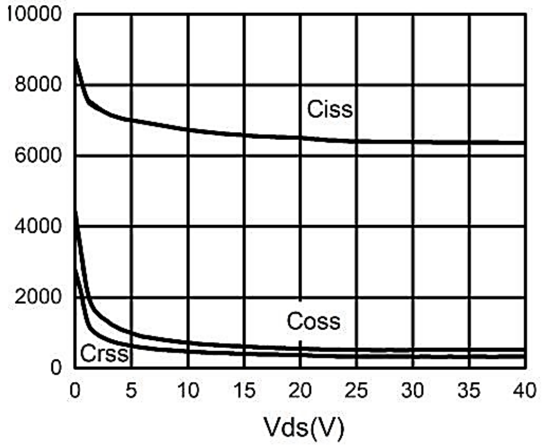


Figure 8. Capacitance

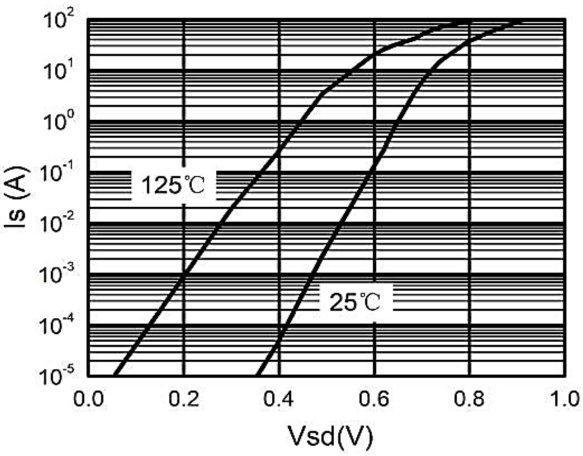


Figure 9. Body-Diode Characteristics

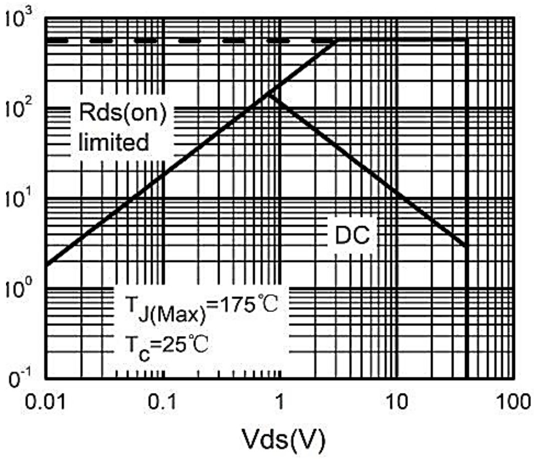
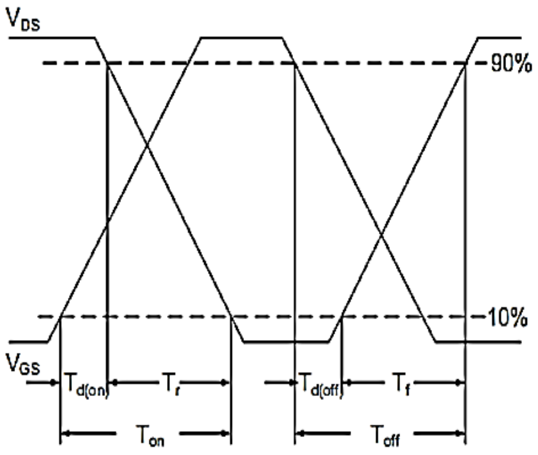


Figure 10. Maximum Safe Operating Area



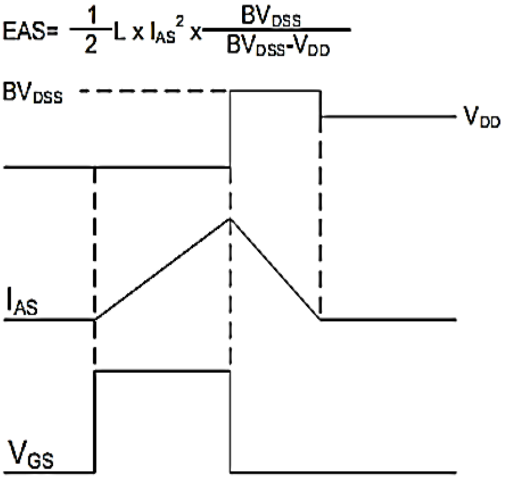
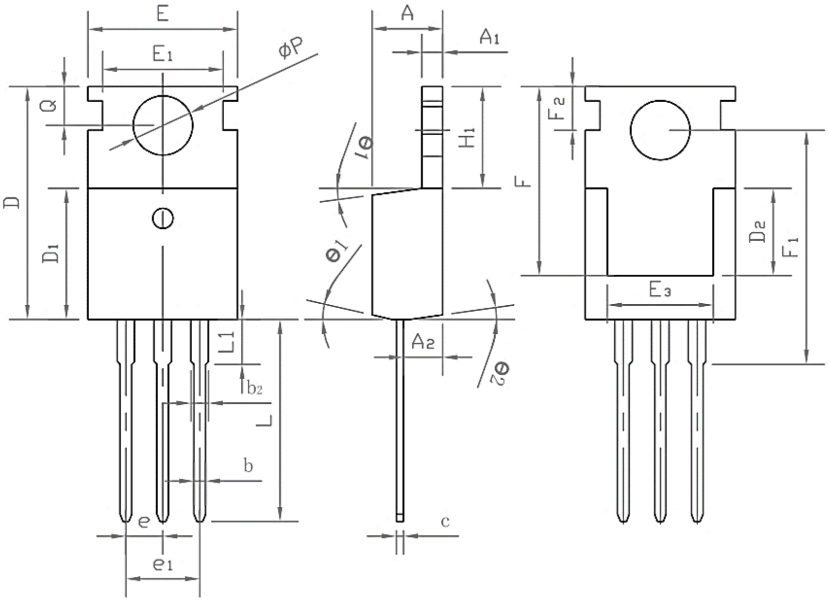


Figure 11.Switching Time Waveform

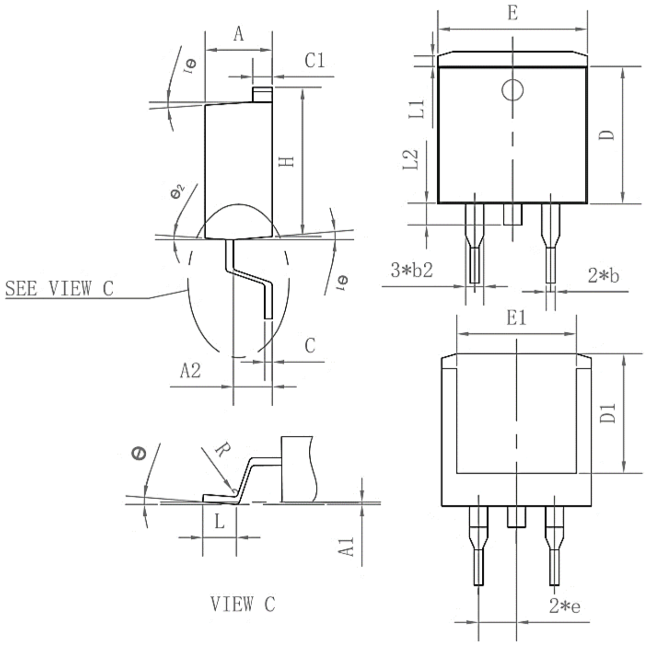
Figure 12. Unclamped Inductinve Wwitching wave

Package Mechanical Data-TO-220-3L-SLK



Symbol	Common		
	mm		
	Mim	Nom	Max
A	4.27	4.57	4.87
A1	1.15	1.30	1.45
A2	2.10	2.40	2.70
b	0.70	0.80	1.00
b2	1.17	1.27	1.50
D	0.40	0.50	0.65
D1	8.80	9.10	9.40
D2	5.70	6.70	7.00
E	9.70	10.00	10.30
E1	-	8.70	-
E2	9.63	10.00	10.35
E3	7.00	8.00	8.40
e	0.37		
e1	0.10		
H1	6.00	6.50	6.85
L	12.75	13.50	13.90
L1	-	3.10	3.40
Φp	3.45	3.60	3.75
Q	2.60	2.80	3.00
θ1	4°	7°	10°
θ2	0°	3°	6°
F	13.30	13.50	13.70
F1	15.50	15.90	16.30
F2	2.80	3.00	3.20

Package Mechanical Data-TO-263-3L-SLK



Symbol	Common		
	mm		
	Mim	Nom	Max
A	4.35	4.47	4.60
A1	0.09	0.10	0.11
A2	2.30	2.40	2.70
b	0.70	0.80	1.00
b2	1.25	1.36	1.50
C	0.45	0.50	0.65
C1	1.29	1.30	9.40
D	9.10	9.20	9.30
D1	7.90	8.00	8.10
E	9.85	10.00	10.20
E1	7.90	8.00	8.10
H	15.30	15.50	15.70
e	-	2.54	-
L	2.34	2.54	2.74
L1	1.00	1.10	1.20
L2	1.30	1.40	1.50
R	0.24	0.25	0.26
θ	0°	4°	8°
Θ1	4°	7°	10°
Θ2	0°	3°	6°

40V N-Channel Enhancement Mode MOSFET

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